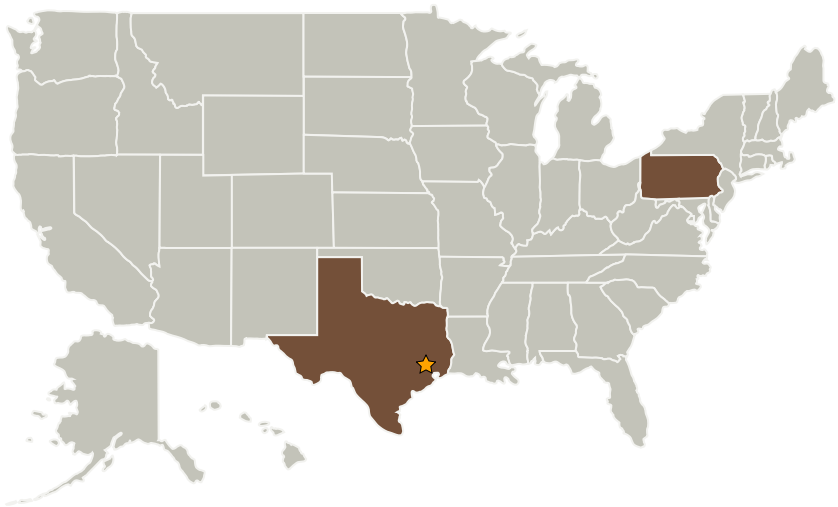
# High Performance Low Mass Nanowire Enabled Heatpipe, Phase I

Completed Technology Project (2008 - 2008)

## Project Introduction

Illuminex Corporation proposes a NASA Phase I SBIR project to develop high performance, lightweight, low-profile heat pipes with enhanced thermal transfer properties enabled by utilizing copper nanowire arrays as the wick material in the heat pipe. Thermal management is a critical issue for advanced electronic and optical systems as current cooling techniques are being rapidly outpaced by the heat load of new technologies. Superior thermal control technologies are needed both for NASA's science spacecraft components and commercial products such as computers and medical lasers. The incorporation of nano-structured materials in heat pipe manufacturing will allow the development of thermal management devices with increased heat dissipation efficiency and a reduced size and weight profile as compared to currently utilized cooling approaches. Illuminex will develop processes to engineer the nanowire wick directly onto the heat pipe package, and using this approach, it s envisioned that heat pipe systems can be manufactured directly into the housings of devices requiring advanced thermal management. This nanotechnology enabled miniaturization can be further size reduced to near the MEMS level for cooling micro-electronics and sensors. Phase II will lead to full commercialization and manufacturing of high performance, low profile, and lightweight heat pipes.

## Primary U.S. Work Locations and Key Partners

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## Table of Contents



## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Johnson Space Center(JSC) | Lead Organization | NASA Center | Houston, Texas |
| Illuminex Corporation | Supporting Organization | Industry | Lancaster, Pennsylvania |

| Primary U.S. Work Locations | |
|---|---|
| Pennsylvania | Texas |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Youssef M Habib

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage